Programme Specification

MEng Mechatronics

1. Programme title	**MEng Mechatronics**
2. Awarding institution	Middlesex University
3. Teaching institution	Middlesex University
4. Details of accreditation by professional/statutory/regulatory body	
5. Final qualification	Master of Engineering (Hons)
6. Year of validation **Year of amendment**	
7. Language of study	English
8. Mode of study	FT/TKSW

9. Criteria for admission to the programme

Admission to the MEng (Hons) Mechatronics programme will require 280 UCAS tariff points normally including a minimum of 200 points from at least two science or numerate based subjects.

In addition Middlesex University general entry requirements apply as outlined in the university's regulation B2. Applicants whose first language is not English are required to achieve 6.0 in IELTS overall (with a minimum of 5.5 in each component) or an equivalent qualification recognised by Middlesex University. The equivalence of qualifications from outside UK will be determined according to NARIC guidelines.

We welcome applicants with a wide variety of educational experience including: A/AS levels, AVCE, BTEC National Diploma, Access Certificates, Scottish Highers, Irish Leaving Certificates (Higher Level), International Baccalaureate and a large number of equivalent home and overseas qualifications. Application from mature applicants with suitable life skills and experiences are also welcomed.

10. Aims of the programme

This programme aims to produce professional and competent Mechatronic Engineers capable of playing an active role in formulating, meeting the challenges and opportunities arising in contemporary industrial and commercial practice.

This program is designed to further enhance problem solving and design skills through a variety

of projects and hands-on laboratory sessions. This includes design and control aspects of mechanical systems that must be operated through electrical/electronic and computer control. Students will improve core critical thinking and design capabilities, which are further developed and enhanced progressively through the course.

This programme further explores the principles underlying the design and implementation of up-to-date mechatronic systems needed in a variety of problem domains and provides the opportunity of realising such systems.

11. Programme outcomes

A. Knowledge and understanding	Teaching/learning methods
On completion of this programme the successful student will have knowledge and understanding of: Comprehensive knowledge and understanding of Scientific principles and related engineering disciplines to enable the modelling and analyse complex engineering systems, processes and products and collect and analyse data and draw conclusions for the innovative solution of unfamiliar or novel engineering design problems using future developments and technologies Extensive knowledge and understanding of concepts, principles and theories of the design process and an appreciation of their limitations. Knowledge and understanding of the application of a systems approach to solving complex engineering problems within the context of Mechatronics. Comprehensive knowledge and understanding of analytical techniques and engineering science relevant to Design Engineering within the context of Mechatronics. Detailed understanding of the issues involved in systems engineering and the range of approaches used in industry to manage the resulting complexity. Extensive knowledge and understanding of developing new technologies and applications relevant to Mechatronics. Extensive knowledge and understanding of current commercial, management and business practices and their limitations relating to engineering and to new product development. Knowledge and understanding of professional and ethical responsibilities of engineers. Comprehensive knowledge and understanding of the role and limitations of common ICT tools and ability to specify	*Students gain knowledge and understanding takes place through a combination of lectures, seminars, exercise classes, design build and test .projects, forensic deconstruction, CAE and IT workshops, laboratory classes, industrial visits, group and individual project work, experimenting, constructing, analysing, assessing and discussing and self-study.* **Assessment methods** Students' knowledge and understanding is assessed by technical reports, coursework assignments, essays, presentations, and practical in- class tests.

requirements for computer-based engineering design tools to solve unfamiliar problems. Extensive knowledge and understanding of a wide range of engineering materials and components.	
B. Cognitive (thinking) skills On completion of this programme the successful student will be able to: Critically analyse and solve engineering problems using appropriate techniques and through critical thinking. Model and critically analyse relevant engineering systems. Fully engage with the design process. Select, justify and apply appropriate computer based methods for solving design engineering problems. Fully evaluate external influences on the design process. Design creative and innovative systems, components or processes.	**Teaching/learning methods** Students learn cognitive skills through design projects, problem solving activities and through report writing. **Assessment methods** Students' cognitive skills are assessed by the products and systems design, with particular reference to their engagement with the design process and by coursework comprised of reports and essays.
C. Practical skills On completion of the programme the successful student will be able to: Plan, manage and undertake a design project, team or individual, including establishing user needs and technical specification, concept generation and evaluation, embodiment and detail design work, verification and review. Critically evaluate technical risk with an awareness of the limitations of possible solutions. Use relevant laboratory and test equipment. Create CAD models and make physical models and prototypes. Interface different technologies to develop integrated systems. Apply engineering design techniques, taking into account of a selection of commercial and industrial constraints. Effectively apply understanding of concepts from a range of fields including those outside engineering to engineering	**Teaching/learning methods** Students learn practical skills through design projects, specific skills inputs and set exercises. **Assessment methods** Students' practical skills are assessed by individual and group projects, lab reports, coursework assignments and practical tests.

design projects .	
D. Graduate skills On completion of this programme the successful student will be able to: Communicate effectively in writing, verbally, graphically and through presentations to groups. Critically apply mathematical methods, computer models, and a scientific approach to solving problems in engineering design. Demonstrate leadership skills and the ability to work effectively as a member of a team. Write computer programmes and use CAE software and general IT	**Teaching/learning methods** Students acquire graduate skills through design projects, competitions, problem solving activities, presentations, and through report writing. **Assessment methods** Students' graduate skills are assessed by coursework assignments including design reports, laboratory reports, other written reports, problems sheets, case studies, software programs, industrial placement, group and individual project reports. .

12. Programme structure (levels, modules, credits and progression requirements)
12. 1 Overall structure of the programme

12.2 Levels and modules		
Level 4 (1)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS

Students must take all of the following: PDE1400 Design Engineering Projects 1 [30] PDE1410 Physical Computing: Electronics [30] PDE1420 Physical Computing: Programming [30] PDE1430 Formal Systems [30]		Students must pass all level 4 modules to progress.
Level 5 (2)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: PDE2400 Design Engineering Projects 2 [30] PDE2410 Engineering in Context [30] PDE2420 Control Systems [30] PDE 2440 Robotics and Mechatronics [30]		TKSW -To progress on to a placement year students must pass all modules at level 5. FT/PT – To progress onto level 6 on the MEng students must achieve a grade 8 or better in all modules
Level 6 (3)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS

Students must take all of the following: TKSW mode only Students must take PDE3250 Thick Sandwich Placement (120 credits – for Diploma of Industrial Studies.) Students must take all of the following: PDE3432 Mobile Robots and Manipulators [30] PDE3422 Industrial Automation and Control [30] PDE3400 Design Engineering Major project [60]	NA	Student must pass ALL modules and achieve at least a 2.1 overall to progress to level 7.

Level 7 (3)	
COMPULSORY	OPTIONAL
PDE4400 Team Project [60]	Students must also choose 2 from the following: PDE4853 Design Engineering Dissertation [30] PDE4410 Embedded Multimedia Systems [30] PDE4803 Advanced topics in Mechatronics [30]

12.3 Non-compensatable modules (note statement in 12.2 regarding FHEQ levels)	
Module level	**Module code**
6	PDE3400
7	PDE4400

13. Curriculum map

See attached.

14. Information about assessment regulations

15. Placement opportunities, requirements and support (if applicable)

Students on the TKSW mode take a placement (36 to 48 weeks) at the end of year 2. A dedicated Employability Advisor helps in the search for an appropriate employer and provides students with appropriate Placement. They also provide students with appropriate guidance and support in preparation for, during and after placement. The placement forms the basis for an assessed report based on the organisation. At the start of the placement students are allocated an individual supervisor who provides support and advice for the duration of the project.

Students following a TKSW placement year are supported through the process of securing a placement, which includes the legal and QAA requirements for placement learning, via tutorial support and the University Placement office.

16. Future careers (if applicable)

As a MEng Mechatronics graduate you will have excellent career prospects; the range of potential employers will be vast across the private, public and not- for-profit sectors
To support students in this activity during their students are encouraged to develop a commercial approach to design engineering via supported live projects with industrial partners and industrial placements. They undertake contextual studies into the nature and contexts of the profession. They interact with a variety of guest lecturers with professional backgrounds. They are supported in developing their exit portfolio, a CV and a career entry plan.
Through these experiences they come to understand design in a commercial context, the nature of the design industries and to plan for their own career entry and development.

17. Particular support for learning (if applicable)

Meeting the learning outcomes of this programme requires active participation in the subject and all practical sessions. Supporting this level of active participation is achieved via regular contact with academic staff, productive and informed support from technical staff, supports provided by Graduate Academic Assistants (GAAs), Student Learning Assistants (SLAs) and the use of online learning materials where appropriate.

The subject provides extensive studio, laboratory and workshop facilities where students can engage with their coursework assignments in a supported and productive environment. These areas are shared with other subjects and programmes.

18. JACS code (or other relevant coding system)	H150- Engineering Design
19. Relevant QAA subject benchmark group(s)	Engineering

20. Reference points

QAA Engineering subject benchmark statement (2015)
QAA Framework for Higher Education Qualifications in England, Wales and Northern Ireland;
Middlesex University Regulations;
Middlesex University Learning and Quality Enhancement Handbook;
UK Standard for Professional Engineering Competence;
Chartered Engineer and Incorporated Engineer Standard, Engineering Council UK, 2014;
The Accreditation of Higher Education Programmes, Engineering Council UK, 2014;
IED Engineering Design Specific Learning Outcomes for EC(UK) Accredited Degree Programmes.

21. Other information

Appendix 2: Curriculum Map

Curriculum map for MEng Mechatronics

Knowledge and understanding		Practical skills	
A1	Scientific principles and related engineering disciplines to enable the modelling and analyse complex engineering systems, processes and products and collect and analyse data and draw conclusions for the innovative solution of unfamiliar or novel engineering design problems using future developments and technologies.	C1	Plan, manage and undertake a design project, team or individual, including establishing user needs and technical specification, concept generation and evaluation, embodiment and detail design work, verification and review.
A2	Concepts, principles and theories of the design process and an appreciation of their limitations.	C2	Evaluate technical risk with an awareness of the limitations of possible solutions.
A3	The application of a systems approach to solving complex engineering problems within the context of Mechatronics.	C3	Use relevant laboratory and test equipment.
A4	Analytical techniques and engineering science relevant to Design Engineering within the context of Mechatronics.	C4	Create CAD models and make physical models and prototypes.
A5	The issues involved in systems engineering and the range of approaches used in industry to manage the resulting complexity.	C5	Interface different technologies to develop integrated systems.

A6	Developing new technologies and applications relevant to Mechatronics.	C6	Apply engineering design techniques, taking into account of a selection of commercial and industrial constraints.
A7	Current commercial, management and business practices and their limitations relating to engineering and to new product development.	C7	Apply and integrate knowledge and understanding of other engineering and non-engineering disciplines to support engineering design activities.
A8	Professional and ethical responsibilities of engineers.		
A9	The role and limitations of common ICT tools and limitations to common ICT tools and ability to specify requirements for computer-based engineering design tools to solve unfamiliar problems.		
A10	Characteristics of particular materials, equipment, processes and products		
Cognitive skills		Graduate Skills	
B1	Analyse and solve engineering problems using appropriate techniques and through critical thinking.	D1	Communicate effectively in writing, verbally, graphically and through presentations to groups.
B2	Model and analyse relevant engineering systems.	D2	Apply mathematical methods, computer models, and a scientific approach to solving problems in engineering design.

B3	Fully engage with the design process.	D3	Demonstrate leadership skills and the ability to work effectively as a member of a team.
B4	Select and apply appropriate computer based methods for solving design engineering problems.	D4	Write computer programmes and use CAE software and general IT tools and provide technical documentation.
B5	Fully evaluate external influences on the design process.	D5	Learn independently and to adopt a critical approach in investigation
B6	Design innovative systems, components or processes.	D6	Use technical literature and other information sources effectively including electronic media.

Programme outcomes																											
A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	A 9	A 10	B 1	B 2	B 3	B 4	B 5	B 6	C 1	C 2	C 3	C 4	C 5	C 6	C 7	D 1	D 2	D 3	D 4	D 5	D 6
Highest Level Achieved																												
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6

Module Title	Module Code by Level	Programme outcomes																											
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	C7	D1	D2	D3	D4	D5	D6
Design Engineering Projects 1	PDE1400							Y	Y			Y	Y	Y	Y		Y	Y		Y	Y			Y	Y	Y	Y	Y	Y	Y
Physical Computing: Electronics	PDE1410				Y							Y	Y							Y	Y					Y			Y	
Physical Computing: Programming	PDE1420				Y					Y		Y			Y					Y		Y			Y	Y	Y	Y	Y	
Formal Systems	PDE1430				Y							Y	Y				Y									Y			Y	
Design Engineering Projects 2	PDE2400		Y	Y				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Engineering in Context	PDE2410		Y			Y		Y	Y							Y				Y			Y	Y	Y		Y		Y	Y
Control Systems	PDE2420	Y			Y	Y				Y		Y	Y		Y		Y	Y		Y		Y			Y	Y		Y		Y

Robotics and Mechatronics	PDE 2440	Y	Y	Y		Y	Y			Y		Y		Y	Y		Y	Y	Y	Y	Y	Y	Y		Y			Y	Y	
Thick Sandwich Placement	PDE3250					Y		Y	Y			Y	Y	Y				Y					Y		Y	Y	Y		Y	
Mobile Robots and Manipulators	PDE3432	Y			Y		Y			Y			Y		Y			Y		Y		Y			Y	Y			Y	Y
Industrial Automation and Control	PDE3422	Y				Y				Y	Y	Y	Y		Y		Y	Y		Y	Y	Y			Y	Y			Y	Y
Design Engineering Major project	PDE3400	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y